

Hot n' Cold, Rain or Shine! Using Community Science Data to Analyze Eastern Painted Turtle Presence in US Humid Continental and Humid Subtropical Climate Zones

Maria Morel Javier¹; Aveena Khan²

¹KIPP NYC College Prep; ²Fordham University | Project TRUE, Wildlife Conservation Society (WCS)



Introduction

In summer 2025, a previous research study² examined three species of freshwater turtles in the Bronx River: the red-eared slider (*Trachemys scripta elegans*), an invasive species, the common snapping turtle (*Chelydra serpentina*), and the eastern painted turtle (*Chrysemys picta picta*).



Img. 1 *Chrysemys picta picta*. Credit: Ryan D., 2020⁶

Environmental DNA (eDNA) analysis and traditional catch and release methods were implemented in this study to survey species' presence. The eastern painted turtle was not detected in neither traditional catching methods nor eDNA analysis, whereas previous monitoring efforts confirmed its presence.^{2,3} This shift may suggest that its population is threatened in this particular region, so enlarging the scope of research by incorporating community science data may reveal alternative habitats.

On a global scale, the eastern painted turtle's geographical range spans bodies of freshwater in eastern ecosystems of the U.S. mainland and is primarily within two climate zones: humid subtropical and humid continental.^{1,4} Humid continental zones contain temperatures in its coldest month below 0°C, at least four months whose average temperatures are equal or greater than 10°C, warm summers (>22°C), and no dry season.⁵ Humid subtropical zones experience -3°C to 18°C in the coldest months, at least eight months with a mean temperature above 10°C, and moderate to high humidity year-round.⁵

This study aims to provide insight into the decreased observations of Eastern painted turtles this year by integrating a thorough analysis of the humid continental and humid subtropical climate zones, both suitable climatic zones for the eastern painted turtles. Using citizen science data collected from the past five years, we propose that these populations may have been displaced from northeast riparian habitats due to anthropogenic influences including urbanization, habitat destruction and fragmentation, and pollution, and are thus shifting to humid subtropical states.

Methodology

iNaturalist, a global citizen science database platform where users record observations of wildlife, was used in this analysis. Observations of eastern painted turtles in the entire continental United States were exported into Google Sheets and Excel for analysis. The data was cleaned and categorized into two groups based on climatic habitat zones: humid subtropical and humid continental, referencing the Köppen climate classification system. To compare eastern painted turtle observations between both zones, data from three states within each zone were analyzed: Massachusetts, New York, and New Jersey representing humid continental habitats, and Virginia, Georgia, North Carolina representing humid subtropical habitats. Data from other states were excluded from this project.

Abstract

Eastern painted turtles are native to the eastern United States mainland, and can be found in two of its distinct climate zones: humid subtropical and humid continental. This study explores which of these two climate zones have higher observations rates of eastern painted turtles. To collect data for this study, research-grade observations from iNaturalist, a global citizen science platform, were exported and visualized. Results indicated that eastern painted turtles had a higher number of observations in the humid continental zone, refuting the hypothesis that higher abundance would be found in the humid subtropical zone. These findings suggest that despite a recent decrease in detection within the Bronx River riparian zone, eastern painted turtles still primarily inhabit the US' humid continental climate zone.

Research Question & Hypothesis

Research Question: How has the population of *Chrysemys picta picta* (eastern painted turtle subspecies) varied between US humid subtropical and humid continental climatic zones from 2020 to 2025?

Hypothesis: The number of eastern painted turtle observations have been higher in humid subtropical regions than in humid continental regions in the eastern U.S. during the past 5 years.

Data & Figures

C. picta picta Observations in US Humid Subtropical Climate Zone

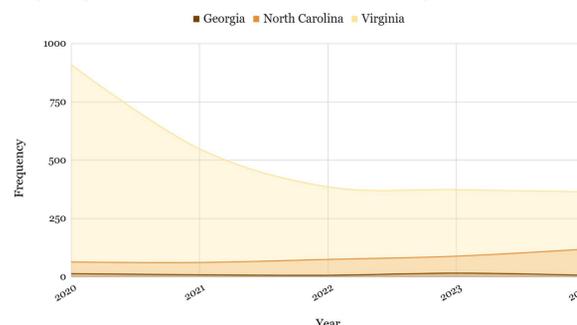


Fig 1: Observations of eastern painted turtles in humid subtropical climate states. Virginia consistently had the highest number of observations.

C. picta picta Observations in Humid Continental Climate States

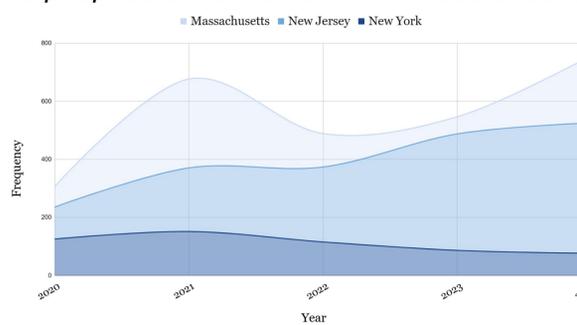


Fig 2: Observations of eastern painted turtles in humid continental climate states. Massachusetts had the highest number of observations.

Distribution of C. picta picta Among All Observed States (2020 - 2025)

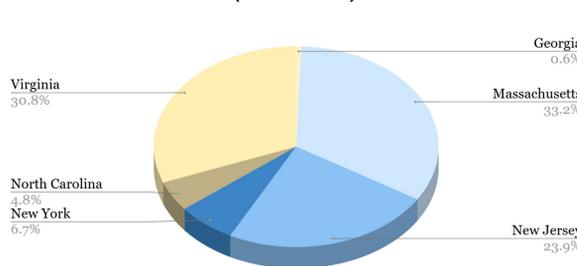


Fig 3: Total distribution of eastern painted turtles compared to each state from humid subtropical climate and humid continental states.

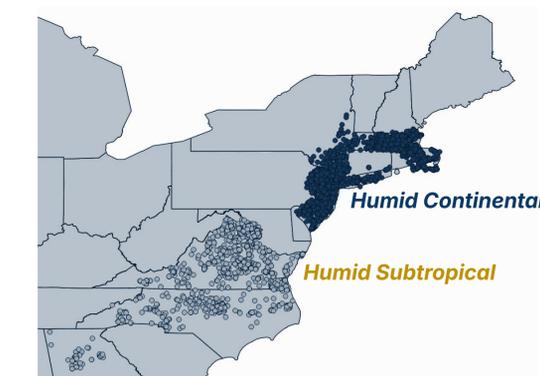


Fig 4: Map demonstrating geographical locations of humid continental and humid subtropical zones in the United States.

Results

Within the humid continental zone, Massachusetts had the highest abundance of observations (n = 2778), whereas New York had the lowest (n = 558) from a total number of 5,333 observations in this zone. These observations fluctuated in frequency in each state, experiencing a rise in 2021, a substantial decrease in 2022, and have been slightly increasing through 2024. This may be attributed to several factors: New York contains more urban centers, is more densely-populated, and its riparian zones are more exposed to pollutants.⁶

Within the humid subtropical zone, there were a total of 3,031 observations in this zone. Virginia had the highest amount of observations (n = 2,579), whereas Georgia had very few over the five studied years (n = 48). Despite the high amount of observations in Virginia, Virginia's number of observations had decreased by about half from 2020 to 2022.

Discussion

Findings do not support the hypothesis that the abundance of eastern painted turtles would be higher in humid subtropical regions than in humid continental zones. Rather, there was a higher number of total observations in humid continental zones than in humid subtropical zones. This may be due to people residing more in urban places like New York and New Jersey than Virginia or North Carolina, where the resident population count is less dense compared to urban places with higher population densities. Alternatively, it is possible that the turtle species has not experienced sufficient pressures, be it anthropogenic or due to climate change, to be both depleted from the humid continental states and begin to surge in humid subtropical states. In fact, observations of the species have decreased in the latter, while steadily climbing in the former.

Limitations of this study were that iNaturalist data only represented a fraction of the actual eastern painted turtle's abundance in a population, and the abundance of this data collected is based on the number of observers using iNaturalist.

This study provides a foundation for further research that may utilize other forms of data collection, such as field observations, followed by building a comparison between field observations and citizen science observations.

Acknowledgements

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References

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